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NEW ACTORS IN THE LIVESTOCK SECTOR IN THE KILIMANJARO REGION

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ABSTRACT This paper analyzes the challenges and potential of the livestock sector in the Kilimanjaro region of Tanzania using field research conducted in Maua village, which is situated on the southern slope of Mt. Kilimanjaro. The Maua people keep every livestock in a hutch, which should suggest to policy makers the magnitude of the problems they and other pastoralists face with the shift from a grazing to a form of feedlot system. Indeed, smallholder livestock farmers face major problems related to feeding, marketing, and breeding.
The Maua people cope with these problems in various ways. The residues of from squeezing boiled bananas to produce the local beer are used as concentrates to supplement grain fed to cattle, and they collect many kinds of roughage such as maize leaves and banana leaves to replace roughage from grazing. The high cost of transporting livestock from lower to higher land also represents a major issue. The Maua people face two options in marketing livestock; one is to sell to a local butcher, and the other is to sell to other farmers. The limited market constitutes the most severe problem and requires further examination.
The introduction of a pig project operated by the women, referred to as KIWAKUKI, represents the most intriguing development in response to these problems. This project expanded widely in the studied area, and this paper discusses three effects the project had on those living in the village: supporting victims of HIV/AIDS, empowering women, and spreading the practice of pig keeping. This project placed women, who organized new groups for keeping another type of livestock and for providing mutual help, in new leadership roles. We can see the potential for alternative forms of organization in such new leadership arrangements.

Key Words: Livestock sector; Feedlot system; KIWAKUKI project; Women's empowerment; Local marketing of livestock.

INTRODUCTION

I. Purpose of the Study

Raising livestock has been a fundamental method of subsistence in Africa because people in arid or semi-arid areas cannot depend on crops. Furthermore, livestock provide a very important way to obtain cash, rendering livestock indispensable as a means for accumulating wealth. As a result, livestock, especially cattle, have come to symbolize economic prosperity and social status.

Thus, many studies have emphasized the social and cultural implications of the value system followed by pastoralists. Although such research is useful for understanding the characteristics of the relevant societies, it is not necessarily helpful for solving the daily problems faced by smallholder livestock farmers. This paper uses data collected during field research in the Kilimanjaro region of Tanzania to analyze the current challenges to and potential of the livestock sector in terms

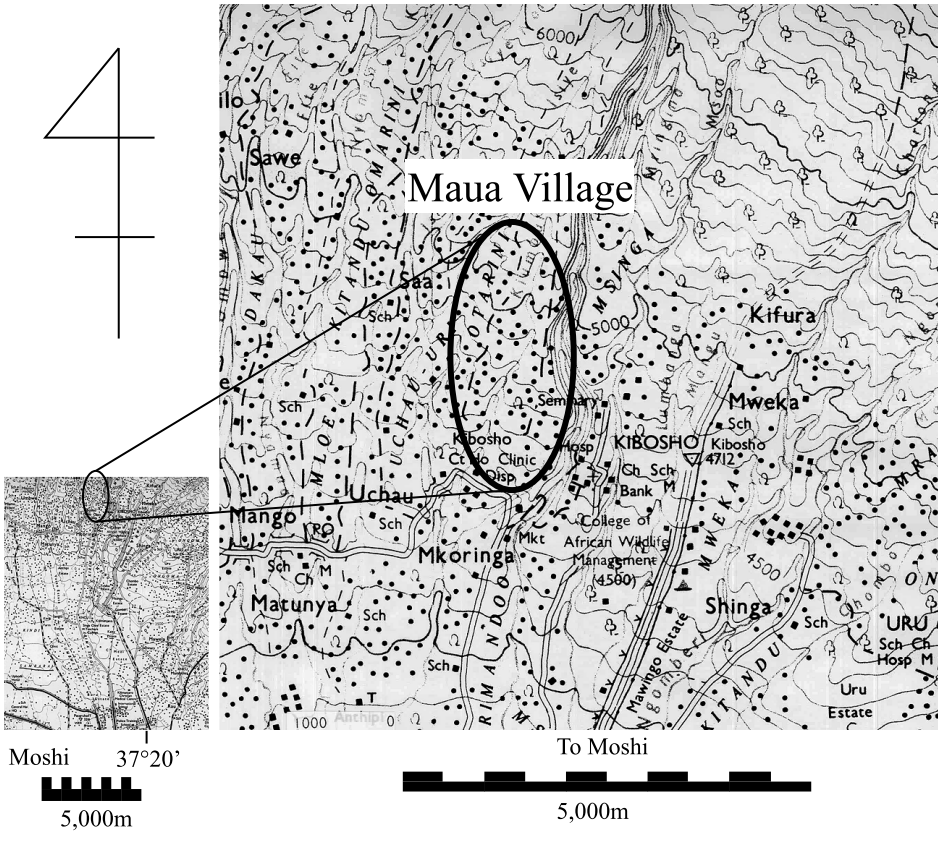

Fig. 1. Location of the Research Area.
Source: Map by Ordnance Survey, Kilimanjaro, 1:100,000.

of improving food security and income generation.

Field research was conducted intermittently during 2005, 2008, and 2010. I used the same structured questionnaire in 2005 and 2008. In 2010, I conducted in-depth interviews with key persons involved in the pig project. Maua village, which is located on the southern slope of Mt. Kilimanjaro, served as the area under study (Fig. 1). People in this area are well known for adopting a sort of agro-forestry system in a kitchen garden or *kihamba*. One of the important features of the *kihamba* system is its integration of agro-forestry with livestock keeping (Ikegami, 1994). These individuals keep their livestock in a hutch because of the shortage of grazing land, which is an important factor contributing to current problems involving the implementation of a feedlot system in the livestock sector. Among the problems the livestock sector is confronting, this paper focuses on aspects of feeding, breeding, and marketing.

II. Policy Background

The Government of Tanzania has issued several policies and strategic initiatives concerning the development of the livestock sector. In 1997, the government produced the first livestock policy, the National Agricultural and Livestock Policy of 1997 (NALP). This policy established objectives to improve the situations of people living in rural areas, promoted the integrated and sustainable use of natural resources, and provided support services to the agricultural and the livestock sectors. The NALP aimed to develop both agriculture and livestock sectors through modernization, which involved increasing productivity and commercializing the traditional methods used to keep livestock.

In April 2001, livestock stakeholders described their vision for their industry as follows: "*By year 2025, there should be a livestock sector, which to a large extent shall be commercially run, modern, and sustainable, using improved and highly productive livestock to ensure food security, improved income for the household and the nation while conserving the environment.*" (UNDP, n.d.: 5).

The NALP was revised in accord with ongoing policy reforms in 2006, and the government formulated the second livestock policy, the National Livestock Policy (NLP), in the same year. Tanzania adopted the Agricultural Sector Development Strategy (ASDS) in 2001 and started the Agricultural Sector Development Program (ASDP), which was based on the concept of sector-wide approaches, in 2006. A new livestock policy that reflected the fundamental ideas of ASDS and ASDP then emerged, and it rested on a market-oriented economy and redefined the roles of the central and local governmenst and private sectors.

The NLP addresses specific issues such as animal registration and traceability, indigenous technical knowledge, emerging diseases, livestock products, regulatory institutions, professional regulatory institutions, veterinary laboratory systems, and so on. The Livestock Sector Development Strategy (LSDS) is being prepared for implementation, as per the NLP, and will take effect by the end of 2010. The final report of the LSDS states that its goal "is to contribute to overall GDP growth, national and household incomes, and growth in export earnings" (Tanzania, MIFUGO, 2009: 21). The growth objective of 9% is identical to that specified by the National Strategy for Growth and Reduction of Poverty (NSGRP), which was completed in 2005 as an updated version of the Poverty Reduction Strategy Paper of 2000.

Five relevant laws have been enacted: the Veterinary Act No. 16 of 2003, Animal Disease Act No. 17 of 2003, Dairy Industry Act No. 8 of 2004, Meat Industry Act No. 10 of 2006, the Hides, Skins, and Leather Trade Act No. 18 of 2008, and the Animal Welfare Act No. 19 of 2008 (Tanzania, 2009: 10). These policies were aimed primarily at implementing regulations, and they forced smallholder livestock farmers to pay additional costs for such practices as record keeping. Thus, smallholder livestock farmers are demanding supports other than the methods mandated by law. Indeed, understanding the actual situations and real demands of smallholder livestock farmers is crucial.

FEATURES OF THE LIVESTOCK SECTOR IN TANZANIA

I. Changes in Production in the Livestock Sector

Tanzania is one of the largest livestock-producing countries in Africa. In 2007, Tanzania was ranked second in cattle, with 18 million head, following only Ethiopia, with 43 million head. In 2007, Nigeria had 52.5 million goats, followed by Ethiopia (21.7 million), Kenya (14 million), and Tanzania (FAOSTAT). Both cattle and goats, which are typical livestock in Africa, are concentrated in several countries, including Tanzania.

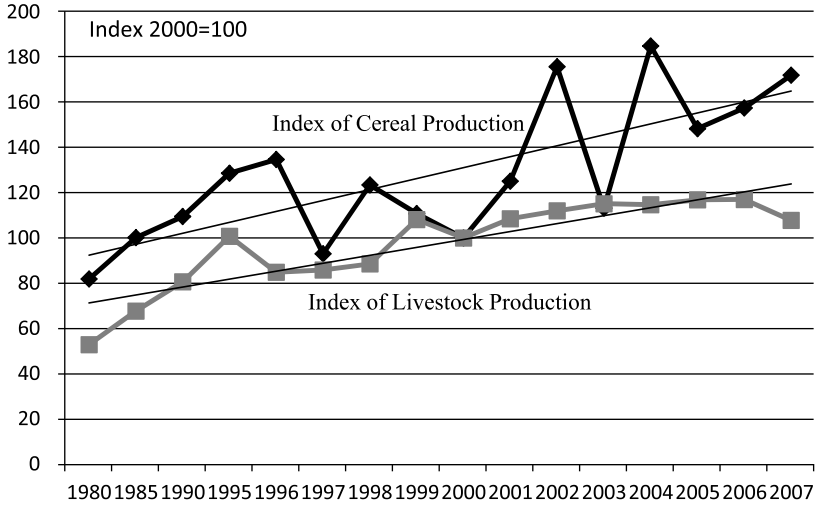

Fig. 2. Changes in the Production of Cereal and Livestock in Tanzania.
Source: FAO, FAOSTAT (http://faostat.fao.org/site/342/default.aspx), Accessed on March 2, 2010.

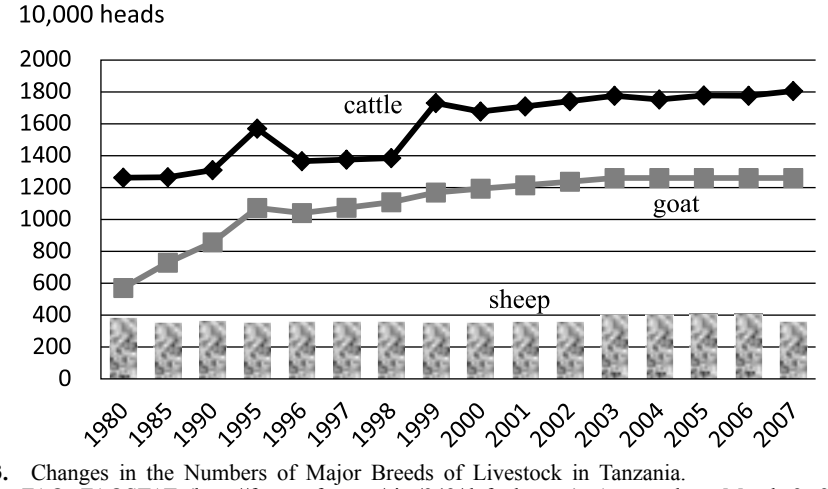

Fig. 3. Changes in the Numbers of Major Breeds of Livestock in Tanzania.
Source: FAO, FAOSTAT (http://faostat.fao.org/site/342/default.aspx), Accessed on March 2, 2010.

Fig. 2 shows changes in the production of livestock and cereals in Tanzania. The production of cereals fluctuated, with production in 2002 and 2004 double that in 2000, whereas production in 2003 declined compared to that in the baseline year. On the other hand, livestock production has been more stable than cereal production and has tended to consistently increase since the 1980s. However, the livestock sector has grown at lower rate than the cereal sector over the long run, as shown in Fig. 2.

According to Fig. 3, approximately 4 million sheep existed in Tanzania, and the number of cattle and goats has been increasing continuously. The increase in cattle and goats led to the expansion of the livestock sector, raising the percentage of the GDP attributable to the livestock sector from 4.3% in 2006 to 5.9% in 2007. However, this growth rate was below the 9% target rate specified in the National Strategy of Growth and Poverty Reduction (NSGRP). Thus, it is important to analyze the reasons behind the poor performance of the livestock sector and to adopt alternative methods that meet the actual needs of smallholder livestock farmers.

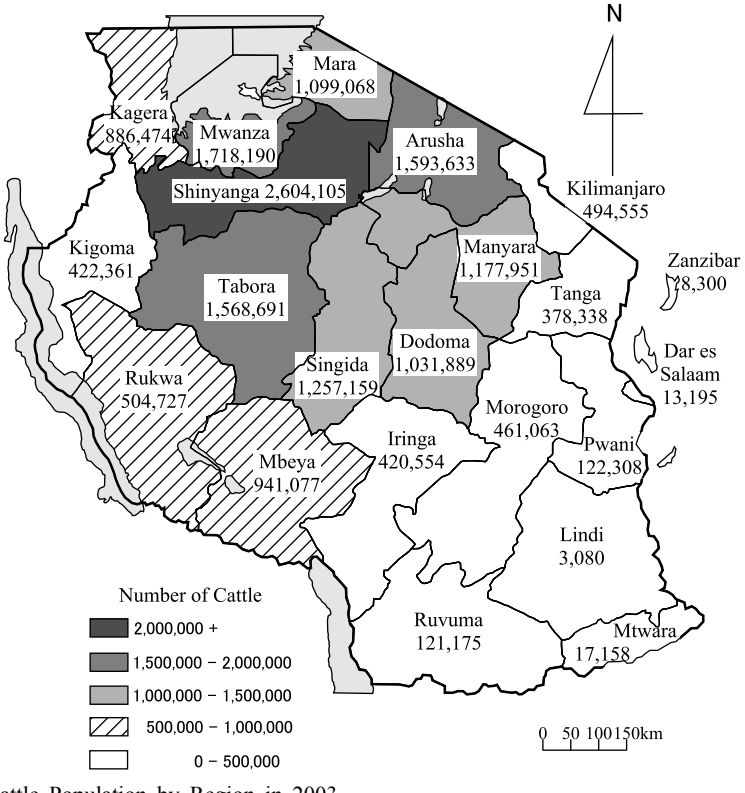

Fig. 4. Cattle Population by Region in 2003.
Source: Tanzania, NBS et al., 2006. *National Sample Census of Agriculture 2002/2003, Volume III, Livestock Sector-National Report*. NBS, Dar es Salaam.

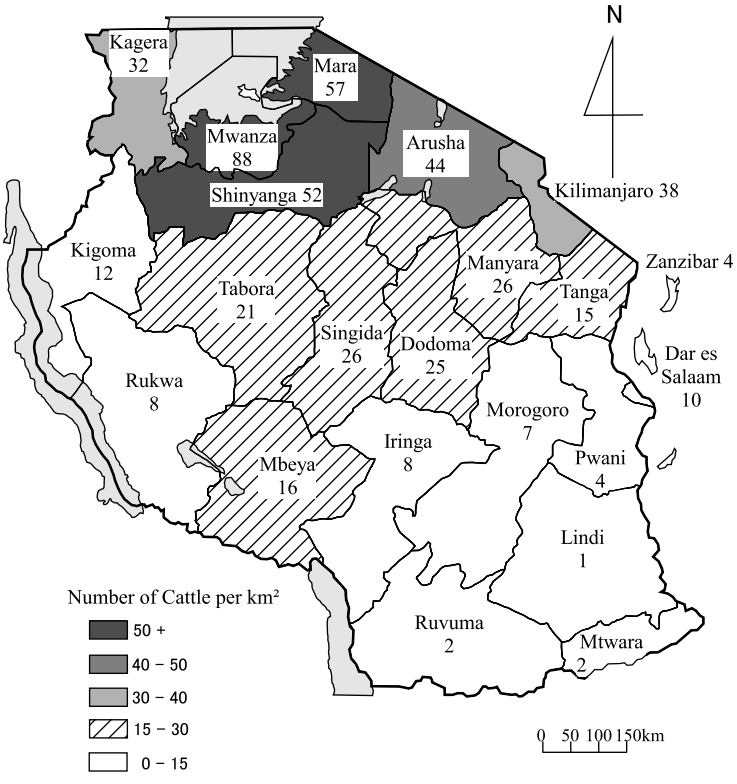

Fig. 5. Cattle Density by Region in 2003 (head/km^2).
Source: Tanzania, NBS et al., 2006. *National Sample Census of Agriculture 2002/2003, Volume III, Livestock Sector-National Report*. NBS, Dar es Salaam.

II. Geographical Distribution of Cattle and Pigs

Livestock keeping varies according to region, and this section explains these differences among regions.

Figs. 4 & 5 show the geographical distribution of the population and the density of cattle in 2003 according to region. In Tanzania, the Shinyanga region had the largest number of cattle, exceeding 2.60 million. The Mwanza region, which is located along Lake Victoria, was ranked second, with 1.72 million head, followed by the Tabora region, with 1.57 million head.

The cattle density in the Mwanza region, which contains 88 head of cattle per km^2, is the highest in the country. The second highest density is the Mara region, with 57 head per km^2. Although the total number of cattle in the Kilimanjaro region is fewer than 0.5 million head, the density (38 head per km^2) ranks in the upper tier.

Figs. 4 & 5 suggest that cattle keeping is concentrated in the border area in northern and central Tanzania; indeed, the vegetation in the arid or semi-arid savannas in these regions is suitable for grazing cattle.

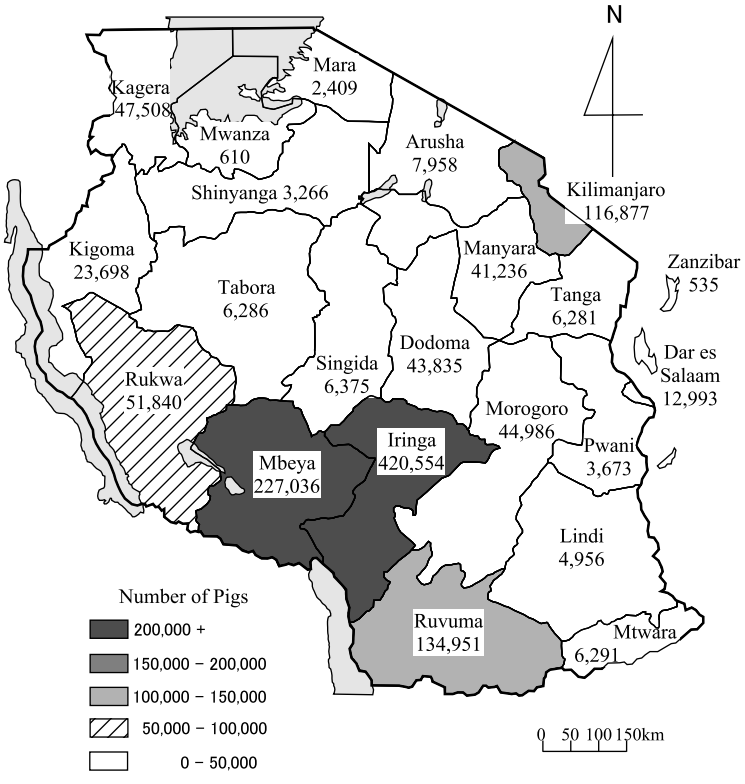

Fig. 6. Pig Populations by Region in 2003.
Source: Tanzania, NBS et al., 2006. *National Sample Census of Agriculture 2002/2003, Volume III, Livestock Sector-National Report*. NBS, Dar es Salaam.

On the other hand, the pig population is concentrated in the southern regions (Fig. 6). The Mbeya region contains the greatest number of pigs, 230,000. The second largest number is the Iringa region, with 180,000; this is followed by the Ruvuma region, which has 130,000 pigs. Although most of the pigs in Tanzania are kept in the southern regions, it is notable that the Kilimanjaro region in the north has approximately 120,000 pigs. The pig density in the Kilimanjaro region is nine head per km^2, which is the highest in Tanzania.

This dispersal of pig keeping may be the result of choices made by farmers to keep animals in hutches to maximize the use of land that is limited owing to high population density. Additionally, pigs are widely considered to be cash animals, unlike cattle, which are considered to be property. This notion has been widely accepted by farmers in the Kilimanjaro region because they are accustomed to a cash economy through coffee production. Furthermore, steady demands from the tourism sector for swine meat can encourage farmers to raise pigs.

FEATURES OF LIVESTOCK SECTOR INVOLVING SMALL FARMERS IN THE KILIMANJARO REGION

I. Features of the Livestock Sector in the Kilimanjaro Region

It is very difficult to ascertain the precise number of livestock in Tanzania. The figures in Table 1 for the Moshi Rural District were obtained from the livestock office. Although the figures are not always reliable, no option for reviewing the overall situation exists at the local level. Thus, it is possible only to roughly understand recent changes with regard to the livestock raised in the Moshi Rural District.

The number of cattle has been gradually decreasing during the past years. The recent drought may have contributed to this decrease in cattle due to the resulting difficulties in grazing. However, the use of cows for milk has been steadily increasing since 2004. The rate of increase in numbers of goats and sheep has been relatively low. On the other hand, the rate of increase in the number of pigs has been high. The rapid increase in the number of chickens in 2008 suggests the introduction of commercial chicken keeping.

To what extent do these changes reflect actual livestock-keeping practices at the level of individual farms? How many farmers are involved in livestock keeping, especially in mountainous areas, where grazing land is severely limited? How do farmers manage to supplement feed? A village-level survey is necessary to answer such questions. I conducted research focusing on land use and home economy in Maua village in 2005 and 2008 using a structured questionnaire that addressed subjects related to the livestock sector; my research in 2010 was focused exclusively on this sector.

According to the data collected in 2005, all 16 farm households kept some kind of livestock, including chickens. Although only five farmers kept cattle, and most of these were used as milk cows at the time of the interview, three farmers each kept a calf, and two other farmers had sold their milk cow during the previous year. The smallest farmers could not afford to keep a large or mid-sized animal. In 2008, I interviewed 26 farm households. The percentage of farmers

Table 1. Number of Livestock in the Moshi Rural District

(head)

	2004	2005	2006	2007	2008
Milking Cow	52,890	52,890	57,758	60,357	63,375
Cattle	81,236	81,236	64,180	64,180	64,160
Goat	127,441	129,478	131,623	131,755	139,342
Sheep	35,000	35,000	36,058	36,094	36,083
Pig	23,659	23,659	25,590	25,616	36,897
Chicken	603,054	553,054	620,821	622,789	850,588
Rabbit	10,339	10,333	12,277	13,447	14,460
Duck	24,000	24,000	24,433	24,457	25,050

Source: The data was collected at the livestock office, Moshi Rural District on August 17, 2010.

Table 2. The History of Livestock-Keeping in Maua Village

(Households, heads)

Research Year		2005	2008
Cattle (Milking)	No of livestock farmers	5	23
	No of H.H selling in a year	3	4
	Average head per farmer		2
Calf	No of livestock farmers	6	10
	No of H.H selling in a year	0	2
	Average head per farmer		2.4
Goat	No of livestock farmers	3	5
	No of H.H selling in a year	0	0
	Average head per farmer		6.2
Sheep	No of livestock farmers	4	8
	No of H.H selling in a year	0	1
	Average head per farmer		5.6
Pig	No of livestock farmers	4	5
	No of H.H selling in a year	2	2
	Average head per farmer		5.7
Chicken	No of livestock farmers	16	25
	No of H.H selling in a year	1	0
	Average head per farmer		6.8
No of Interviewed households		16	25

Source: Interviews were done in 2005 and 2008.

Table 3. The Situation of Livestock Farmers in 2010

Farm No	No of livestock (heads)					Milk Product (litre)	Sales of pig		Sales of other livestock	
	Cattle	Goat	Sheep	Pig	Chicken		Number (heads)	Amount (Tsh.)	Livestock (kind)	Amount (Tsh.)
1	2	4	0	0	20	0	0	0	Cattle	900,000
2	3	0	0	0	23	0	0	0	Cattle	350,000
3	10	0	0	0	24	2	0	0	0	0
4	1	0	0	1	5	0	4	265,000	0	0
6	3	0	0	1	3	2	2	140,000	0	0
7	2	0	2	0	10	3	0	0	0	0
8	1	4	0	0	6	1	0	0	0	0
10	0	0	0	35	0	0	2	88,000	0	0
11	1	0	0	0	1	2	0	0	0	0
12	3	0	0	0	3	8	0	0	0	0
13	1	0	3	0	13	0	0	0	Sheep	110,000

Source: Interview with farmers.

Table 4. Economic Status and Livestock Ownership Status in Semi-arid Tanzania

The name of the group	Livestock
Very poor	Might have chicken, don't own or borrow any other
Poor	Borrow 5 cattle, might have 1 lactating cow
Lower middle	Both own and borrow cattle (about 5–7 in total), own 5–7 shoats, 1 lactating cow
Middle	Own 10 cattle, own 10 shoats, 2 lactating cows
Rich	Own 30 cattle (15 of which are loaned to other groups), 3 lactating cows

Source: Morris, M. et al. (2001), cited in UNDP, (n.d.), p. 18.

with cattle had increased significantly in 2008, but the situation remained similar to that in 2005 (see Table 2).

The research in 2010 targeted only those farmers who kept livestock. Table 3 presents information about livestock farmers, with the exception of members of the KIWAKUKI group, which will be discussed later. According to Table 3, each farmer tended to keep livestock in addition to two or three kinds of small animals. The average numbers of livestock per household were as follows: 2.7 head of milking cow, 4.0 head of goats, 2.5 head of sheep, 10.3 head of pigs, and 10.8 head of chicken. Table 3 suggests that the pig sector is gradually growing, whereas the goat and a sheep sectors are gradually shrinking due to the lack of grazing land.

Tables 2 & 3 also suggest that livestock farmers rarely sell their livestock. They do not seem to sell willingly except when they need access to large amounts of money for such purposes as educational fees for secondary schools or colleges. Indeed, pig keeping has come to supplement cattle raising as a major method of earning income among livestock farmers. Currently, pigs are considered to be a source of "hot money" indicating great liquidity. Goats, sheep, and chickens are commonly used for home consumption,

Morris (2001) divided livestock farmers into five groups according to the number of cattle owned or borrowed Economic status varied from the "very poor," who owned only a few chickens, to the "rich," who owned many cattle, as shown in Table 4. According to this table, most livestock farmers in Maua are in the poor category, which may relate to the lack of resources. Nevertheless, this group is active in seeking possibilities for development.

In general, small-scale livestock keeping is closely related to the survival strategy of small farmers. According to this view, these individuals do not seem to follow an economic strategy whereby production is increased through concentrated purchases of livestock.

However, some livestock farmers are becoming more economically savvy. Those involved in the dairy sector, in particular, are following a market-oriented approach to production. The use of cows for milk fits well with using a hutch to keep such livestock. Currently, the production of milk is so insufficient that farmers use the milk from their cows for their own families. However, some farmers sell milk or home-processed yoghurt at a local market, and others try to feed milk cows cereal waste or tuber crops to increase milk production.

In the Arusha region, several women's groups have already started to sell dairy

products such as cheese and yoghurt that they have made themselves. Small and medium modernized dairies also exist in the Kagera and Iringa regions (Larsen, 2009). The extent to which such new situations can contribute to socio-economic development in rural Tanzania is important to note.

II. Feed Conditions and the Breeding of Cows for Milk

Livestock farmers on the slope of Mt. Kilimanjaro are facing a severe shortage of grazing land. Because they intensively use their small areas as a variety of kitchen gardens, no land for grazing remains. As a result, they must keep their livestock, even chickens, in a hutch and depend on purchased forage. Yet, it is

Photo 1. *Kitabolo* for Livestock.
Photo by K. Ikegami on August 18, 2010.

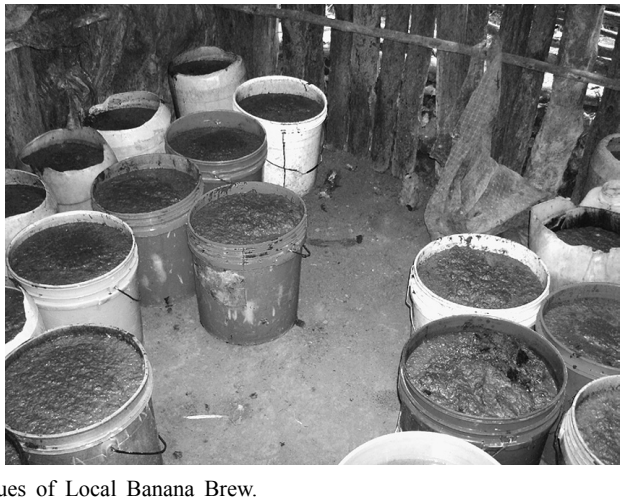

Photo 2. Residues of Local Banana Brew.
Photo by K. Ikegami on August 19, 2010.

difficult for a small livestock farmer to buy sufficient quantities of expensive cereal feed. How do they feed their livestock?

Livestock farmers in Maua village generally use "*kitabolo*" or "*matabolo*" (plural), which is the residue left after squeezing boiled bananas to make the local brew(1) (Photo 1). *Kitabolo* is usually mixed with "pollard," the brand name of cereal bran. It is recommended that a farmer provide 1 kg of pollard in the morning and 2 kg in the afternoon to a cow that is used for milking. "*Masamvu*," which is composed of solid materials left over from straining banana juice (Photo 2), and *kitabolo* are also used as feed.

Maize leaves and straw are brought up from the lowlands for use as roughage. A livestock farmer has to negotiate with the owner of the field about how much maize and straw he can purchase per acre, and he must also make transportation arrangements with the owner of a vehicle such as lorry or truck. The average cost of maize leaves varies from 15,000 Tsh. to 40,000 Tsh. per acre, and transportation costs about 73,000 Tsh. per lorry. A livestock farmer frequently purchases other fresh roughage such as Guatemala grass, banana leaves, and forest grasses at the cost of 1,000 Tsh. per bundle in the village.

Another problem for livestock farmers is how to breed or procure young livestock. Young livestock available at auctions are often unaffordable and also require costly transportation from the market to the village. Accordingly, farmers try to breed their own livestock or find young livestock as near to their house as possible.

In Maua, one aged farmer played an important role in cattle breeding and in the distribution of young calves. He had practiced breeding on an individual basis using natural methods, and many farmers had bought calves from him. However, he retired without a successor, and no specialized breeder currently resides in Maua. Thus, cattle farmers must seek another way of securing cattle. One method involves purchasing a calf from public institutions such as the nearby Kibosho Mission or the Teachers Training Center. These public institutions sometimes sell calves or other young livestock to finance their own activities. The other approach involves traditional breeding using a free stud service. A farmer who wants to breed his cattle independently can ask an owner of a bull to provide the stud service at no cost. However, this traditional system is seldom practiced because bull farming has decreased.

III. The System of Marketing Meat in Maua

Another challenge for livestock farmers involves how to sell their livestock. When auction markets for livestock or large slaughtering facilities are located near their villages, farmers can provide their own transportation. However, this approach is often unavailable to livestock farmers in Maua because Maua is distant from most such venues. Livestock auctions occur regularly at the local level. One of the largest auction markets in the Kilimanjaro region is located in Weruweru, where middlemen operate commercially; the Himo market, however, is operated directly by farmers. Although the major customers are livestock middlemen, who trade primarily in cattle, many butchers and farmers also buy

livestock at auction. It is also worth noting that, except for the tourist sector, the pig market is limited in the Kilimanjaro region. In general, local butchers buy livestock directly from farmers at the village level.

Due to the additional transportation costs, selling livestock in the town of Moshi is virtually out of the question even if the price of livestock is high. Thus, livestock farmers have only a few options for marketing their products. The first method involves selling live animals to a local butcher in the same or a neighboring village. The second involves selling them in the local market, Mkoringa Market in the village of Kilimo, which is situated next to Maua. The third involves selling livestock to other farmers. Livestock farmers generally choose the first option because they cannot expect a large demand from local people or neighboring farmers. In brief, butchers play central roles in the marketing chain of meat in Maua. Accordingly, in what follows, I will outline the marketing system followed by a local butcher.

Fig. 7 illustrates a typical system for marketing livestock in Maua. Livestock farmers, who buy young animals from a local breeder (a farmer) or, rarely, from a livestock middleman, sell their livestock directly to a local butcher. Although a butcher can also buy livestock at an auction, he typically prefers to buy from local livestock farmers, which is consistent with the traditional practice of trading

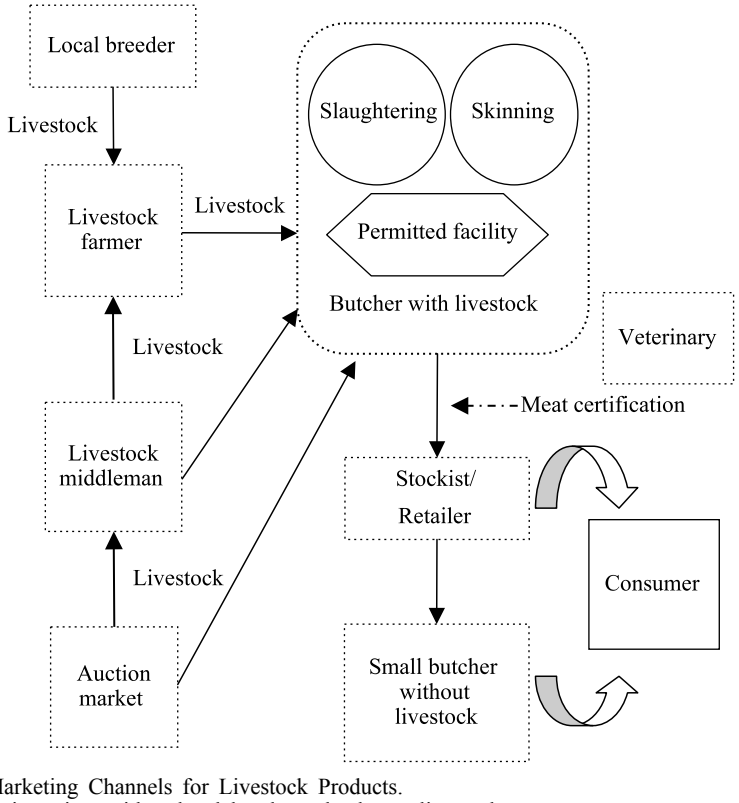

Fig. 7. Marketing Channels for Livestock Products.
Source: An interview with a local butcher who keeps livestock.

livestock, especially cattle, and may result in greater profit for the butcher.

A local butcher interviewed for this research reported that he usually buys live cattle, but he can also use his own cattle. During a sale, the butcher and a livestock farmer agree that a cow provides, for example, 100 kg of meat, and the appropriate amount of money is exchanged. If the actual weight is 140 kg, the butcher can sell the entire amount of meat to consumers and other stockholders/retailers.

The proceeds from the 40-kg difference between the advance estimate and the actual weight goes to the butcher, who subtracts 18 kg as payment for fees associated with slaughtering, skinning, and inspection, as required by the Meat Act. The butcher also has to pay rental fees for the use of the slaughterhouse and a retail shop. Accordingly, the butcher receives 22 kg as his profit.

The profit accruing to a butcher according to this trading system depends on his ability to evaluate how much meat he can get from the cattle he purchases. Once a butcher and a cattle keeper reach an agreement, the butcher renders payment according to the advance estimate, even if the actual weight of the meat is less than the estimate. Accordingly, a butcher must risk losing money due to an over-estimate. Expertise in evaluating the cattle-to-meat ratio is a crucial factor in operating a butcher business.

Another major issue for butchers is the large initial investment required to start a business of this sort. This issue can be understood in terms of two financial factors. One factor is related to the ability to offer cash payment. Although the price of beef frequently fluctuates, the cost of beef is estimated at about 3,000 Tsh. per kg in Maua. If a cattle keeper agrees to sell his cow as 100 kg of meat, a butcher is obligated to immediately pay 300,000 Tsh. If he fails to pay before the animal is slaughtered, he loses the trust of the farmers and cannot continue to operate his business. The second factor is related to regulations governing the facilities used for slaughtering and other related activities. The Meat Act requires a high-quality facility with a permit for slaughtering; meeting this standard entails a large investment.

THE PIG PROJECT IN THE KILIMANJARO REGION

As mentioned earlier, the Kilimanjaro region has one of the highest concentrations of pigs in the country. The so-called KIWAKUKI project is contributing to the expansion of pig keeping, and this section focuses on this project.

I. A Brief History and an Overview of the Structure of the Pig Project Undertaken by the KIWAKUKI Group in the Kilimanjaro Region

Sister Alexander of the Roman Catholic Church organized the KIWAKUKI (*Kikundi cha Wakinamama Kupambana na Ukimwi Kilimanjaro*) women's group in Kilimanjaro, which was named in recognition of its purpose, which was to fight HIV/AIDS. This rural area has many orphans and widows whose parents or husbands had died from HIV/AIDS. Sister Alexander attributed this problem,

in part, to the disempowered position of rural women. Thus, she established the KIWAKUKI project to support the victims through the empowerment of rural women.

At its inception in 1998, the KIWAKUKI project consisted of approximately 50 women from Kibosho East, Kilima, and Maua. Relying on an idea offered by a member when the project became operational in May 2002, Sister Alexander introduced a system whereby at least one pig was given to each member of every group at no cost.

To this end, Sister Alexander approached Heifer Project International (HPI)[(2)], an international nonprofit charitable organization based in the US but with an office in Arusha Town, and negotiated with one of its coordinators. She succeeded in obtaining 1.8 million Tsh. in 2003 and purchased 31 pigs, which were distributed to 25 families that were divided into five groups. Criteria for inclusion were willingness to pursue four specific objectives: 1) to care for orphans and other disadvantaged children, 2) to care for widows, 3) to share piglets with other member of the group, and 4) to provide the first female pigs to the project as compensation for administrative costs.

The financial support from HPI, consisting of 1.8 million Tsh. per year, continued for three years until 2005. In 2007, Sister Alexander received a private donation from the US. A post-graduate student from the US who was familiar with Sister Alexander had told her relatives about the KIWAKUKI project after returning home; this family donated money to this effort.

The total number of villages involved in the KIWAKUKI project reached 36, and 199 women members had already received pigs by 2010. The formal office

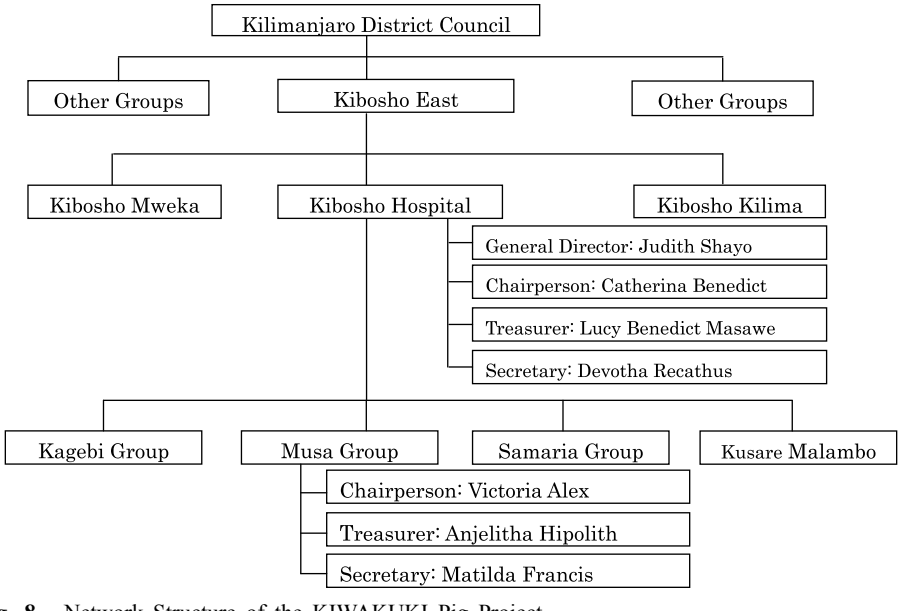

Fig. 8. Network Structure of the KIWAKUKI Pig Project.
Source: Illustrated by Ikegami on the base of interviews with General Director of Kibosho East and Chairperson of Musa Group.

of the KIWAKUKI project is located at the Kilimanjaro District Council (KDC), which supervises the project. Actual administrative and other activities are performed under the direction of Sister Alexander. The member women organize sub-groups in villages or certain territories.

Residents of Maua village are included in the Kibosho East group, which is composed of several sub-groups. Working with hospital employees, Maua women organized a sub-group at Kibosho Hospital. This sub-group at Kibosho Hospital was divided into four smaller groups, Kagebi, Musa, Samaria, and Kusare Malambo (Fig. 8).

As explained above, the pig project operated through the KIWAKUKI project depended on donations for purchasing sows and boars. However, the basic idea of the KIWAKUKI project involved the achievement of independence and sustainable management, including the re-generation and provision of sows and boars. Thus, one might wonder about the mechanisms that have sustained this project.

II. Mechanisms Underlying the KIWAKUKI Project

If women farmers wish to participate in the KIWAKUKI project, they must initially organize a group by themselves and communicate with Sister Alexander. They are next required to form a committee to supervise and control or monitor the distribution of pigs. Third, they are required to prepare a hutch for pig keeping. If a pig hutch meets the conditions stipulated by the General Director of the Kibosho Hospital sub-group, the fledgling group is given some pregnant sows or a set of sows and a boar.

These pigs are provided under the agreement that the women will distribute new piglets to other members. Therefore, the group must establish the selection criteria used to determine who receives the first sow. After selection, the contract between the first recipient and the group is finalized in the presence of their husbands. The basic term of each contract is three years. If a sow dies within three years, no penalty is imposed, but the original recipient has to wait until the end of the next distribution cycle to receive a replacement.

The method of distributing of piglets is presented in Fig. 9. In general, a pregnant sow delivers 6–10 piglets. If the first sow delivers eight piglets, including two males, the piglets are distributed according to the following rules: 1) a woman can take two piglets for herself and either raise the second as a sow or sell them both to a butcher or to other farmers who want to raise them, 2) a woman must give two piglets to other members who have not yet received a piglet, 3) a woman may be required to return two piglets to Sister Alexander so that she can give them to another group, or 4) the male pigs are sold to be slaughtered. The amount of money that results from these endeavors is divided between her group and the pig owner herself according to a certain rate.

If a woman cares for the first sow adequately and uses the free stud service, which is provided by the first boar and maintained by a committee of the group, it will deliver piglets during the following year. The piglets are then distributed in the same way as in the first year. Members have to distribute the piglets from the first pig according to the predetermined criteria. Before delivering a piglet, a

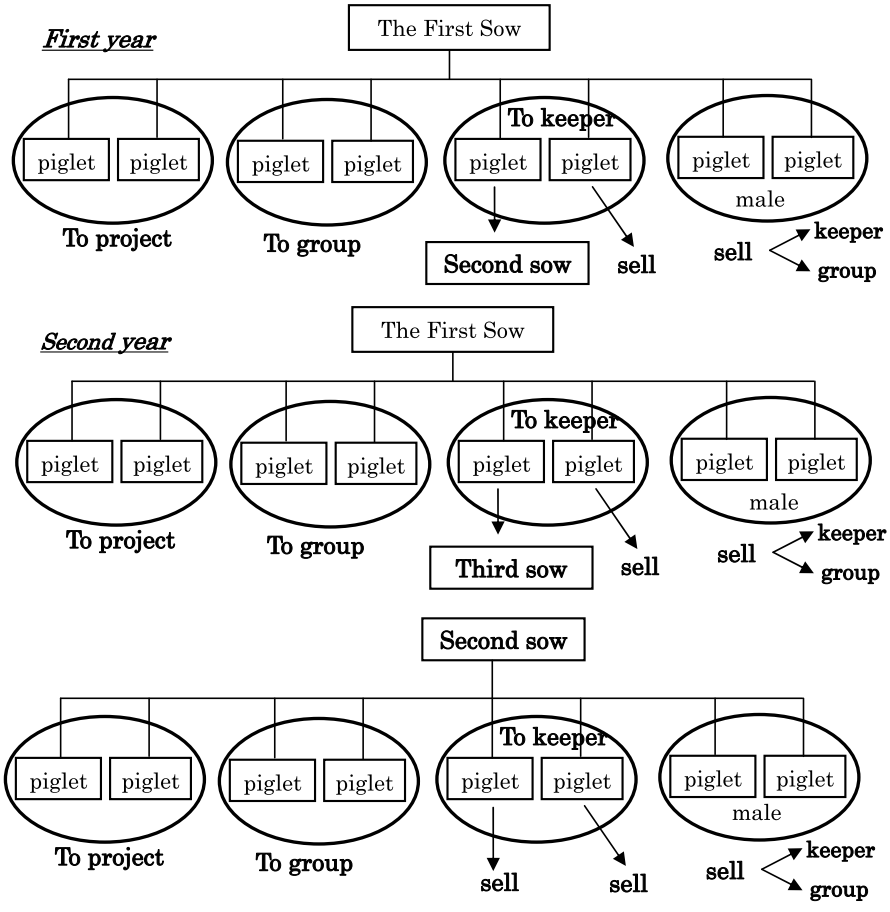

Fig. 9. Mechanism by which the KIWAKUKI Project Distributes Pigs.
Source: Illustrated by Ikegami on the base of interviews with General Director of Kibosho East and Chairperson of Musa Group.

committee of the group confirms that the intended recipient has built a good hutch for pig keeping. Thus, the committee members visit to review the condition of the hutch. When this criterion is satisfied, the woman will be allowed to pick piglets. During this process, committee members master certain related knowledge, such as book keeping and accounting.

When the first woman's piglet grows into a sow that can deliver piglets, these offspring are distributed according to the aforementioned rules. If women can keep some piglets, their pig-keeping business can expand more rapidly. However, it is difficult to keep pigs because farmers must continue to buy feed even in the absence of cash income. This is a disadvantage of livestock keeping.

Group income is derived from the sale of piglets by member women. Committee members view the sales process twice each year to ascertain how much is produced. The funds obtained after selling piglets are used to assist or help children who were orphaned due to HIV/AIDS infections suffered by their parents. A major

activity of this group is to provide financial assistance to orphans, widows, and HIV/AIDS victims. Such assistance includes school uniforms, food, notebooks, and so on. Potential recipients are identified by the KIWAKUKI members within each ward.

III. The Effects of the KIWAKUKI Project

Research conducted in August of 2010 identified several members of the KIWAKUKI group. Of these, I was able to interview six women with pigs. Table 5 outlines the results of this in-depth research.

Of the six women interviewed, No. 9 had not yet kept a pig. Of the remaining five, No. 15 and No. 17 had not sold pigs in 2009; No. 15 had just started to keep pigs, and she had to wait until the piglets matured, whereas the sows under the care of No. 17 had failed to conceive. The other three women received fairly large amounts of money for their pigs, raising questions about who bought the pigs and if they were sold to a local butcher for particular reasons.

Table 5. Outline of the Animal Husbandry Practices of Women Involved in the KIWAKUKI Project

Farm No	No of livestock (heads) (2010)					Milk Product (litre)	Sales of pig (2009)		Sales of other livestock (2009)	
	Cattle	Goat	Sheep	Pig	Chicken		Number (head)	Amount (Tsh.)	Livestock (kind)	Amount (Tsh.)
5	1	0	0	2	25	2	4	240,000	0	0
9	1	2	0	0	0	2	0	0	0	0
14	1	0	0	1	10	0	2	65,000	Chicken	6,000
15	0	0	0	4	1	0	0	0	0	0
16	2	0	0	3	4	0	2	140,000	0	0
17	2	0	0	2	4	0	0	0	Chicken	20,000

Source: Interview with farmers in 2010.

No. 16 started pig keeping in 2005, when she received six piglets. She returned one piglet to Sister Alexander and gave two to other members. She sold the remaining three piglets to farmers in the village. In 2006, the first sow delivered seven pigs, four of whom went to other members and one of whom was sold to a neighboring farmer. No. 16 decided to keep one piglet as a successor to the first sow and fatten up the other. In 2007, the first sow did not deliver, and the contract period passed, so she sold it to a butcher for slaughtering. Currently, her pig farming depends on a successor sow.

No. 17 also started to keep a sow in 2005; it delivered nine piglets, one of whom died of disease. Five piglets were sold to farmers, and two went to other members. One piglet was taken by Sister Alexander. In 2006, the first sow delivered 15 piglets, four of whom died. She sold the rest of the piglets to farmers. In 2007, she received four piglets and sold two to farmers. The remaining two piglets were living in her hutch as of 2010. The case of No. 17 suggests that a woman does not have to give piglets to other members every year.

As mentioned above, the KIWAKUKI project has contributed to the expansion of pig keeping in the village, which was accomplished despite an insufficient market. The price of pigs has been stagnant during these years. Despite the rapid growth of the pig population, the marketing channel has not changed. The KIWAKUKI project has not been eager to explore new marketing channels or build a logistical network.

Some women understand why the price of pigs is stagnant and realize that, although the KIWAKUKI project is playing an important role in pig-keeping and supporting orphans affected by HIV/AIDS, over-dependence on pig-keeping can have an adverse effect. Thus, on their own initiative, these women introduced additional projects such as shifting from keeping pigs to keeping dairy cattle or to organizing a kitchen group to raise eggs.

CONCLUSION

The 2005 NSGRP set its target at increasing the growth rate of the livestock sector from 2.7% in 2000/01 to 9% by 2010 (Tanzania, 2005). Livestock keeping has played a very important role in the daily livelihood of people in Tanzania. Most smallholder farmers keep a small inventory of livestock. Accordingly, many studies about livestock keeping, especially cattle raising, have been conducted. Only 14% of Tanzanian cattle are kept by pastoralists, whereas 80% are owned by agro-pastoralists (Tanzania, MIFUGO, 2009: 6). Nevertheless, less research has focused on smallholder livestock farmers than on pastoralists. Policies for the livestock sector have been determined without detailed studies at the grassroots level, which is one of the reasons that previous top-down policies have not necessarily worked well.

This paper examined how smallholder livestock farmers are attempting to solve the many challenges related to feeding, breeding, and marketing by using a case study at the level of the village. In the studied village, Maua, smallholder livestock farmers keep every type of livestock, even chickens, in hutches because of the shortage of grazing land. Livestock keeping in Maua can be regarded as a sort of feedlot system. Thus, this case study carries implications for the kinds of issues faced by pastoralists or agro-pastoralists when they change their grazing system to feedlots and suggests potential solutions to the problems they may encounter.

Smallholder livestock farmers depend on purchased forage. However, they tend to use large amounts of roughage such as maize leaves and straw, Guatemala grass, banana leaves, and forest grasses rather than to rely exclusively on concentrates such as cereals and pollard. More importantly, they utilize by-products of the local brewing process to supplement concentrates. This strategy suggests the potential for securing feed from unused natural and artificial resources.

The KIWAKUKI project plays an important role in breeding and securing young animals in Maua. This project focuses on pig distribution. This paper revealed that the KIWAKUKI project had three kinds of effects on the people in the village studied. The first was to assist orphans and widows and to care for HIV/AIDS

victims, which constituted the initial objectives of the KIWAKUKI project. The second was to improve the socio-economic status of rural women through income-generating activities and to empower them by such means as improving literacy, teaching accounting and record keeping, and so on. Additionally, some members of the original project have organized a few women's groups for keeping other livestock and intend to initiate a new approach, including the establishment of a mutual help group. The third effect was to expand the practice of pig keeping in Maua. Members of the KIWAKUKI group distributed piglets not only to other members but also to neighboring farmers in the village.

It is natural that the small market would constrain efforts to further expand pig keeping. However, the emphasis should be placed on the potential effects of women's empowerment because this phenomenon opens new possibilities and offers new leaders that emerge from the grassroots level.

This paper cannot explain all the actual and potential factors related to aspects of the relevant technological issues. In Maua, as well as in Tanzania as a whole, many livestock die from diseases such as helminthiosis and pleural pneumonia every year (Tanzania, NBS, 2006). Foot-and-mouth disease is also a severe problem. Veterinary services are inadequate, and smallholder livestock farmers can seldom buy drugs for their animals. Moreover, the calving rate is low, the calving intervals are too long, and the pre-weaning mortality rate is high. These problems will be addressed by another research project.

NOTES

(1) Banana juice is used as a local brew. Recently, some small factories manufacturing local brew have been emerging as a cottage industry. Thus, it is relatively easy to get *Kitabolo* and *Masamvu*.

(2) HPI provides livestock and plants to support financially disadvantaged people to relieve hunger and extend sustainable agriculture.

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